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A NEW GENUS AND SPECIES OF THE FAMILY HYPOGASTRURIDAE (COLLEMBOLA) FROM SKELSKAYA CAVE IN THE CRIMEA

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A New Genus and Species of the Family Hypogastruridae (Collembola) from Skelskaya Cave in the Crimea. Vargovitsh R. S. — *Taurogastrura skelica* gen. et sp. n. of the family Hypogastruridae from Skelskaya Cave in the Crimean Mountains is described. The new genus belongs to the "hypogastrurian" lineage of genera with reduced number of ommatidia.

Key words: Collembola, Hypogastruridae, new genus, new species, cave, Crimea, Ukraine.

Новый род и вид семейства Hypogastruridae (Collembola) из Скельской пещеры в Крыму. Варгович Р. С. — Описан новый род и вид ногохвосток семейства Hypogastruridae из Скельской пещеры в Крыму. Новый род принадлежит к «гипогаструрной» линии родов с редуцированным количеством глазков.

Ключевые слова: ногохвостки, Hypogastruridae, новый род, новый вид, пещера, Крым, Украина.

Introduction

Crimean speleofauna and especially collembolan cave fauna is still insufficiently known. At the beginning of the 20th century a troglobite *Oncopodura hamata* Carl et Lebedinsky, 1905 and recently two troglophile species of the genera *Ceratophysella* Börner, 1932 and *Micraphorura* Bagnall, 1949 (Skarżyński et al., 2001; Kaprus' et al., 2002) were described from this area. The subject of present paper is another new collembolan, this time from Skelskaya Cave located on the branch of the Aj-Petri Massif (670 m a. s. l.) in the south-western part of the Crimean Mountains.

There are forty genera of the family Hypogastruridae recognized currently. Among them Thibaud et al. (2004) distinguished 23 genera with less than 8+8 ommatidia, which were grouped in 3 lineages: "hypogastrurian", "ceratophysellan" and "xenyllian". For our purposes, in connection with the species described below, here we consider only genera of these groups, which possess postantennal organ, empodial appendages, furca and two anal spines.

The ceratophysellan lineage (genera *Ceratophysella*, *Schaefferia* Absolon, 1900, *Typhlogastrura* Bonet, 1930 and *Bonetogastrura* Thibaud, 1975) includes genera with well-marked differentiation of micro- and macrochaetae and relatively long anal spines. Besides, these genera are characterized by the absence of the seta m_2 on mesothorax and presence of only 2 dorsolateral sensilla around microsensillum of the fourth antennal segment (Babenko et al., 1994; Thibaud, 1972, 1980)[1].

Close to the genus *Hypogastrura* Bourlet, 1839 ("hypogastrurian" lineage) are *Orogastrura* Deharveng et Gers, 1979 and *Mesachorutes* Absolon, 1900 with weakly or non-differentiated dorsal setae and short anal spines. Presence of the seta m_2 on the mesothorax and 3 dorsolateral sensilla on the fourth antennal segment is common in these genera.

The status of species described here is in line with the "hypogastrurian" pattern; it seems to be related to the genera *Hypogastrura*, *Orogastrura* and *Mesachorutes*. This placement is supported by the following characters found in the new species: presence of the seta m_2 on mesotorax, presence of the weakly knobbed tibiotarsal seta, number of the dorsolateral sensilla on the fourth antennal segment, relatively short anal spines and narrowed mucronal tip. However, the differentiation of dorsal setae and the presence of the basal lamella

[1] *Ceratophysella bengtssoni* Ågren, 1904 does not fit this pattern, probably its taxonomic status should be revised.

on empodium distinctly separate the described species from the species of the related genera with reduced number of ommatidia (*Orogastrura* and *Mesachorutes*) (table 1). It is also obvious that if the "ommatidia-number" and "pigmentation" characters are ignored, the new species should be included in the genus *Hypogastrura*. It is natural to suggest that the species described below was derived from an epigean *Hypogastrura*, which regressively evolved into the blind and unpigmented form in the cave environment. Nevertheless, current systematics of the family excludes all the "hypogastra-like" species with reduced number of ommatidia from *Hypogastrura* into several separate genera (Thibaud et al., 2004). Diagnosis of the genus *Hypogastrura* formally does not allow including eyeless species in it. I could not therefore assign peremptory the new species to any of existing genera and a new genus is established for this single species.

Taurogastrura Vargovitsh **gen. n.**

Type species: *Taurogastrura skelica* Vargovitsh sp. n.

Differential diagnosis. Blind unpigmented Hypogastruridae with the following set of characters: somewhat differentiated chaetom, presence of m_2 seta on mesothorax, slightly knobbed tibiotarsal seta (knob sometimes absent), empodial appendages with basal lamella, fourth antennal segment with 3 dorsolateral sensilla around microsensillum, mucro without broad lateral lamella and with narrow tip. It is similar to *Hypogastrura* differing by the absence of ommatidia and pigmentation. It differs from other related genera (*Mesachorutes* and *Orogastrura*) by the presence of basal lamella on empodia, complete absence of ommatidia and differentiation of dorsal setae (table 1).

Etymology. Generic name reflects historical name of Crimea – Tauria.

Taurogastrura skelica Vargovitsh **sp. n.** (fig. 1—3)

Material examined. Holotype ♀, 1.5 mm, Ukraine, Crimea, Aj-Petri Massif, 14.08.1998 (Vargovitsh), Skelskaya Cave (type locality) (Schmalhausen Institute of Zoology, Kyiv). Paratypes: 3 ♂ and 4 ♀, collected together with the holotype (Schmalhausen Institute of Zoology, Kyiv).

Description. Body length 1.1—1.5 mm in females and 0.8—0.9 mm in males. Colour light-whitish in alcohol, without traces of pigmentation on eyes fields. Ommatidia absent. Granulation rather coarse with about 8 granules between setae p_1 on the fifth abdominal tergum. Body setae differentiated, although not strongly (more distinctly in young specimens). Dorsal setae, especially macrochaetae, slightly serrated. Dorsal sensilla smooth, relatively long, somewhat longer than macrochaetae. Ventrally thoracal segments without setae. Head: antenna ratio 1 : 0.7.

Head. Dorsal chaetotaxy as in fig. 1, *1* and 1, *2*. Eyes field consists of 3 (rarely asymmetrically 2) setae. Postantennal organ 4-lobed, anterior pair of lobes larger than posterior pair (fig. 2, *3*), accessory boss absent. Mandible with molar plate and 4—5 apical denticles. Outer lobe of maxilla with simple palp and 2 sublobal hairs. Head of maxilla as in fig. 2, *4*. Labrum with 5, 5, 4 setae, apically with 6 blunt tubercles. Prelabral setae – 4, frontoclypeal – 4. Labial palp as in *Hypogastrura*, *Ceratophysella* and related genera (Fjellberg, 1999) with 5 main papillae, 14 guard setae, 3 hypostomal setae and 6 proximal setae with sockets at their bases (fig. 2, *5*).

Table 1. Main differences between genus *Taurogastrura* gen. n. and related genera

Таблица 1. Основые различия между родом *Taurogastrura* gen. n. и близкими родами

Character	*Hypogastrura*	*Mesachorutes*	*Orogastrura*	*Taurogastrura* gen. n.
Ommatidia per side	8	2 (3)	5—7	0
Pigmentation	+	— (except ocular area)	+	—
Differentiation of dorsal setae	— or +	—	—	+
Basal lamella on empodia	+ or –	—	—	+
Shape of mucro	various shapes	straight, pointed	reduced or absent	straight, pointed
Teeth on tenaculum (per side)	3—4	5 (4)	3	3

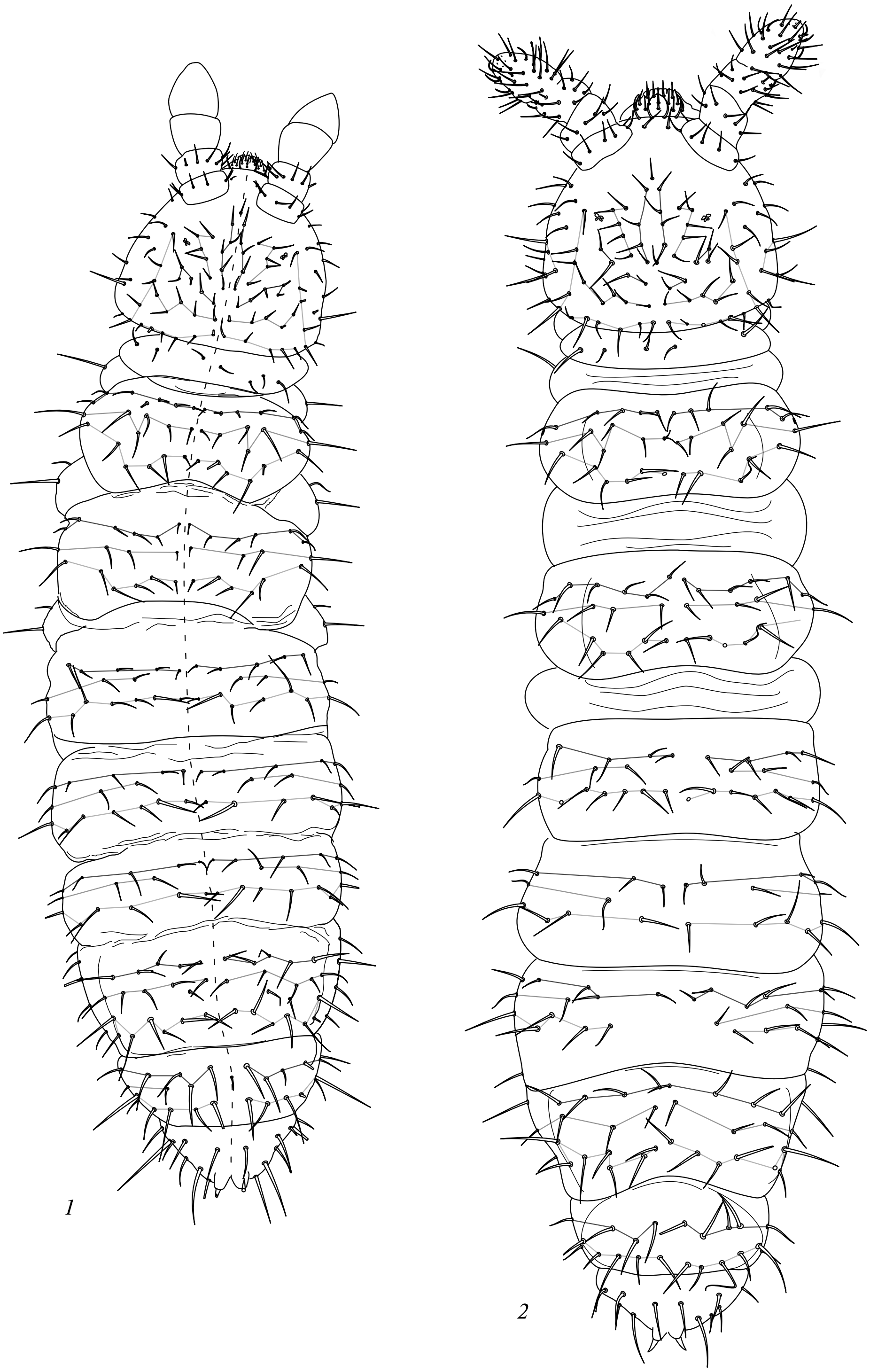


Fig. 1. *Taurogastrura skelica*: *1* – dorsal chaetotaxy of subadult female (1 mm); *2* – dorsal chaetotaxy of the largest adult female (1.5 mm).

Рис. 1. *Taurogastrura skelica*: *1* – дорсальная хетотаксия неполовозрелой самки (1 мм); *2* – дорсальная хетотаксия наиболее крупной взрослой самки (1,5 мм).

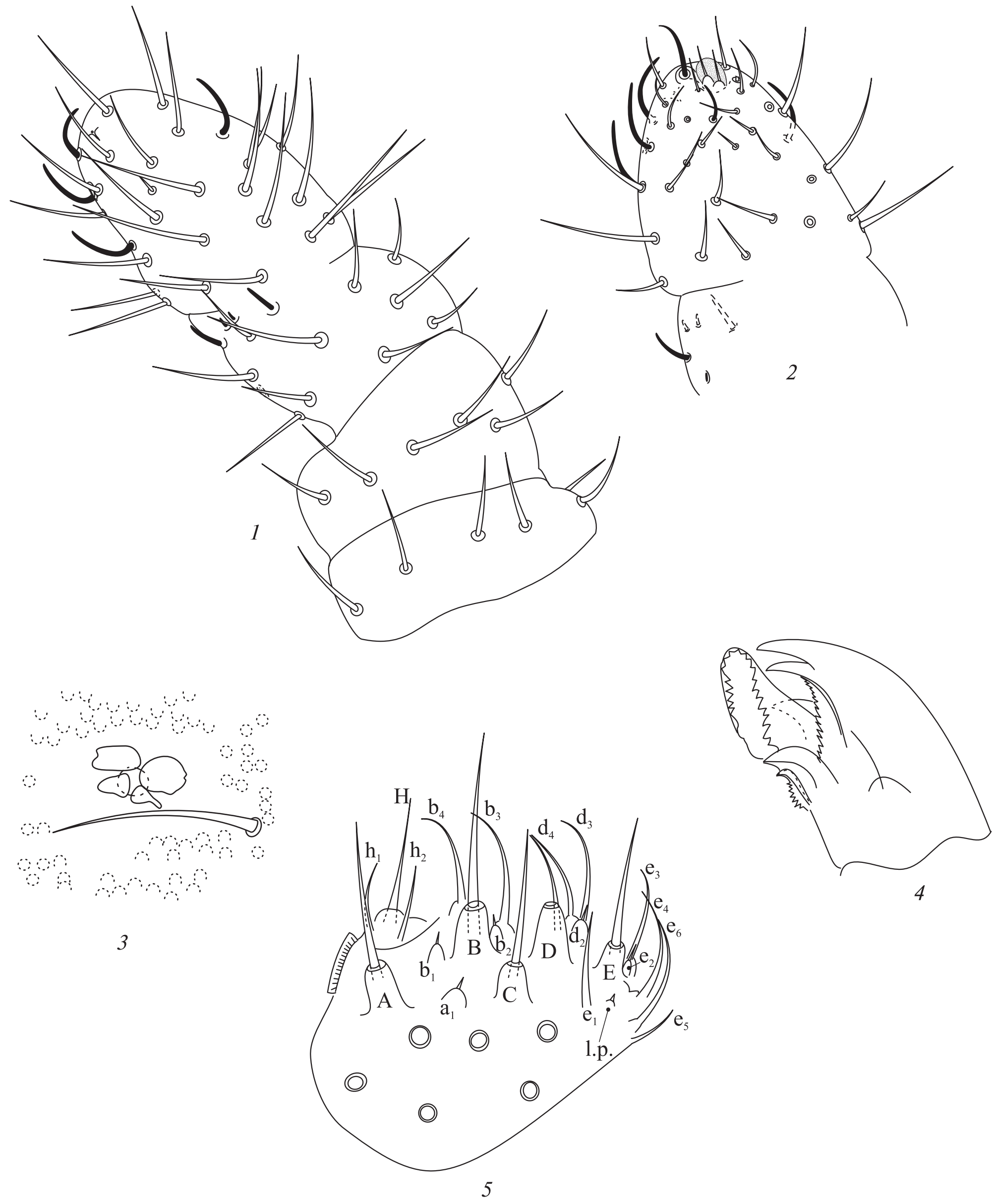


Fig. 2. *Taurogastrura skelica*: *1* — antenna, dorsal view; *2* — Ant. IV and apex of Ant. III, ventral view; *3* — postantennal organ; *4* — head of maxilla; *5* — labial palp (labeling after: Fjellberg, 1999).

Рис. 2. *Taurogastrura skelica*: *1* — усик, вид с дорсальной стороны; *2* — четвертый и апикальная часть третьего членика усика, вид с вентральной стороны; *3* — постантеннальный орган; *4* — головка максиллы; *5* — лабиальная пальпа (обозначения по: Fjellberg, 1999).

Antenna (fig. 2, *1*). Ant. I with 7 setae. Ant. II with 12 setae. Ant. III with 19 setae, antennal III-organ (two long and between them two short sensilla) and ventro-external microsensillum. Ant IV with 4 slightly thickened sensilla (3 — dorsolateral and 1 — dorsointernal), microsensillum, subapical organite and simple globular apical vesicle. Ventral chaetotaxy as in fig. 2, *2*.

Dorsal chaetotaxy of body (fig. 1, *1* and 1, *2*): Prothorax: 3+3 (4+3; 3+2) setae present, the most lateral seta — macrochaeta (sometimes — mesochaeta). Mesothorax: a-row: a_1-a_6 present, a_2 and a_3 somewhat longer than a_1 and subequal to each other

(sometimes a_3 slightly longer); m-row: m_1-m_5 and m_7 (after Fjellberg, 1998 — m_6) present, m_4 located lower than m-row level, m_5 — macrochaeta; p-row: p_1-p_6 present, macrochaeta p_2 only slightly outgoing from p-row line (very rarely asymmetrically distinctly exserted), p_4 — lash-like or strait sensilla — subequal or longer than macrochaetae, p_5 and p_6 — meso- or macrochaetae. Lateral microsensillum on mesothorax present. Metathorax: a-row: a_1-a_6 present, a_1 located higher than a_2, a_5 — macro- or mesochaeta; m-row: setae m_1, m_3, m_5 (macrochaeta) and m_7 (long sensilla) present; p-row: as on mesothorax, sometimes p_2 — mesochaeta not much longer than p_1. Abdominal segment I: a-row: a_1-a_2 and a_4-a_6 (or a_3-a_5 after: Fjellberg, 1998) present, a_6 — larger than other setae of the row (meso- or macrochaeta); m-row: m_3-m_4 (after: Fjellberg, 1998) and m_7 present; p-row: p_1-p_7 present, p_2 and p_7 — macrochaetae, p_5 — long sensilla (usually longer than macrochaetae). Abdominal segments II and III: in general, chaetotaxy resembles such on abdominal segment I; p_4 and p_6 often look like mesochaetae. Abdominal segment IV: a-row: as on previous abdominal segments — 5 setae present but generally they are larger: a_2 often looks as mesochaeta, a_5 — meso- or macrochaeta, a_6 — large macrochaeta; m-row: in the most complete case setae m_1-m_5 present, even additional setae between rows m and p can be observed, however in large adult specimens some setae often omitted (often asymmetrically); p-row: complete (p_1-p_7), p_1 — meso- or even macrochaeta only slightly shorter or almost equal to p_2, p_4 — macrochaeta comparable with p_2 (or p_1), p_5 — long sensilla, p_6 — the largest

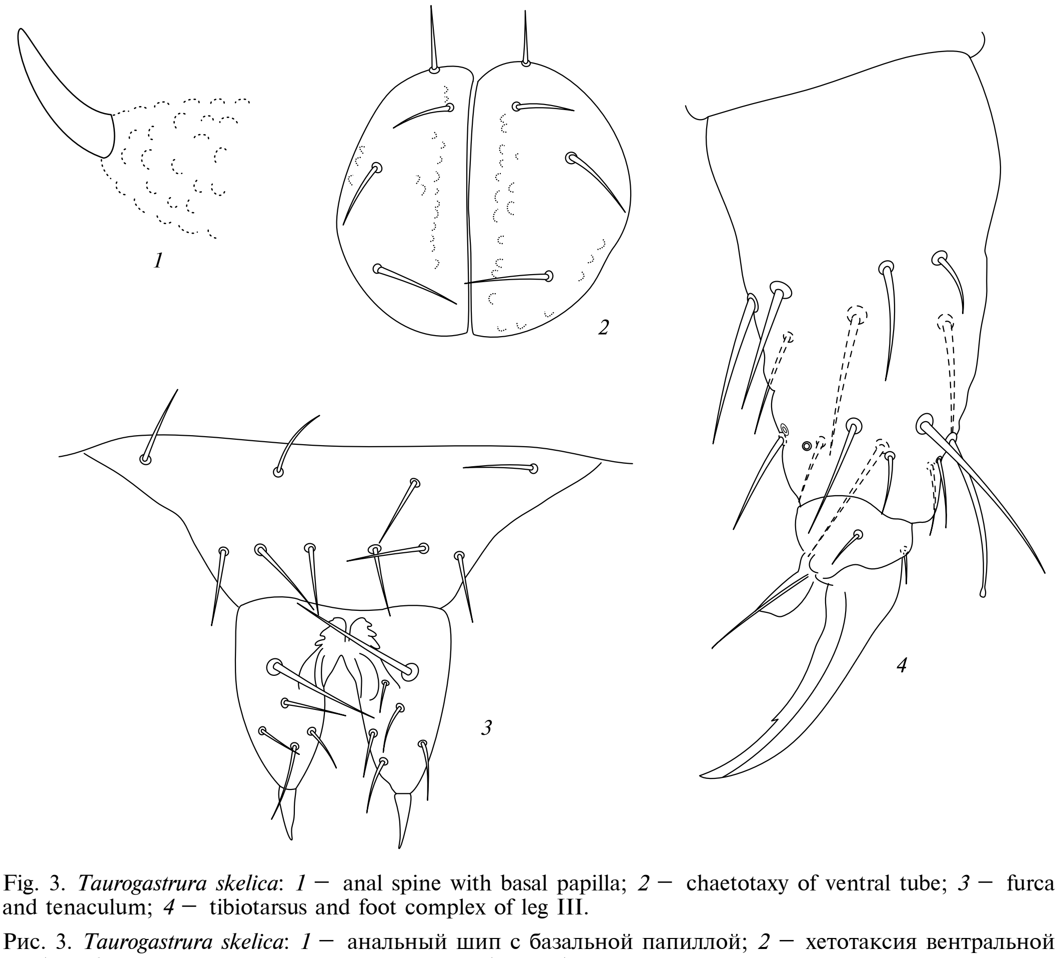


Fig. 3. *Taurogastrura skelica*: *1* — anal spine with basal papilla; *2* — chaetotaxy of ventral tube; *3* — furca and tenaculum; *4* — tibiotarsus and foot complex of leg III.

Рис. 3. *Taurogastrura skelica*: *1* — анальный шип с базальной папиллой; *2* — хетотаксия вентральной трубки; *3* — прыгательная вилка и зацепка; *4* — тибиотарсус и дистальный комплекс задней ноги (коготок и эмподий).

macrochaeta. Abdominal segment V: a-row: (a_1-a_5): a_1, a_2, a_4 – macrochaetae, a_2 shifted into position of m-row; m-row: generally absent, but 1–2 setae on the row-line in young specimen were observed; p-row: 6 setae: p_1 and p_5 – macrochaetae, p_3 – long sensilla. Abdominal segment VI: 2 rows of setae present. Anal spines somewhat curved upward, relatively short – 2 times shorter than claw; basal papilla subequal to corresponding anal spine (fig. 3, *1*).

Tibiotarsi 1–3 with 19, 19, 18 setae respectively, one slightly knobbed seta present (knob often unnoticed or absent). Claw with inner tooth. Empodial appendage with broad basal lamella, slightly longer than half of inner edge of claw (fig. 3, *4*).

Ventral tube with 4+4 setae (fig. 3, *2*). Tenaculum with 3+3 teeth (fig. 3, *3*). Furca normally developed (fig. 3, *3*). Dens with 5 (4–6) setae; subbasal macrochaeta somewhat shorter than dens. Mucro without lamella, apically pointed. Dens 2.7–3.5 as long as mucro, and subequal or slightly shorter than claw of 3rd pair of legs (claw / dens = 1.04–1.13).

V a r i a b i l i t y. Dorsal chaetotaxy of head and body as well as dens chaetotaxy show certain variability (often asymmetric) that can be seen from comparison of young specimen (fig. 1, *1*) with the most complete chaetotaxy and the largest adult female (fig. 1, *2*) in which some setae, especially abdominal, are omitted. Knobbed seta on tibiotarsus apparently is rather variable – in many cases knob is very indistinct or not seen at all. In one case 3 prelabral setae with one of them axial (instead of 4 without any axial) were observed.

B i o n o m y. The specimens were collected in the dark zone of the cave from the decaying wooden matter and from the water surface of small pools. The species is probably troglobite.

E t y m o l o g y. The species name is referred to the only place of finding – Skelskaya Cave.

R e m a r k s. Apart from the absence of pigmentation and ommatidia, *Taurogastrura skelica* gen. n et sp. n. is comparable with some representatives of *Hypogastrura* “viatica” group with somewhat differentiated dorsal setae, 3+3 teeth on tenaculum, normal anal spines and with broad basal lamella on the empodial appendages (*H. viatica* (Tullberg, 1872), *H. barguzini* Babenko, 1994 etc). The presence of several knobbed tibiotarsal setae and mucro with broad lamella are among the characters, which quite well differentiate those species from the new species.

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